

have appeared before are derived. The familiar figure in Denham and Clapperton's work of a mail-clad warrior and horse of Bornu is copied without any kind of acknowledgment. Very slight differences have been made in the present figure: thus in it the great toe only is placed in the stirrup instead of the whole foot, as in the original, and the ear-blade is double instead of single, whilst the helmet has a plume added, but all the rest is directly copied without any reason being given for the alterations. A most remarkable defect in the book, considering that it is German and scientific, is the almost entire absence of references to former works of all kinds. As far as we have been able to discover there are only two references to other books in the entire work, one to Fournel's "Les Berbes," the other to the publications of the German Geographical Society. Though Barth and Duveyrier are mentioned and their views are quoted, no references to their writings are given. And Denham and Clapperton are entirely ignored even in the account of Bornu. A serious drawback is that the book is published so long after the travels to which it relates were completed. We hope that the second volume may not be long in appearing. We understand that the book is shortly to be published in English. It is full of interesting and valuable matter and of scientific details.

THE SCIENCE OF AGRICULTURE

First Lessons in the Science of Agriculture; for Use in Indian Elementary Schools or Classes. Pp. 67. By J. B. Fuller. (Calcutta: Stanhope Press, 1879.)

THIS little primer is issued under the authority of the Department of Agriculture and Commerce, North-West Provinces and Oudh. If its teachings be accepted and followed by those for whom they are intended, increased and improved crops must be the consequence. Of course, within the narrow limits of some seventy small pages, we cannot expect to find the scientific basis of the art of agriculture fully developed; indeed, the explanations of the materials and processes with which Indian farming is concerned are neither numerous nor full. But to show clearly a few of the worst mistakes made by Eastern cultivators of the soil, and to indicate remedies and improved methods of procedure in but half-a-dozen cases, is a useful beginning of an important work. We note, in passing, a few examples of the recommendations, based upon scientific knowledge, which Mr. Fuller makes in these "First Lessons." On p. 7 the usefulness of a good tilth and of a feeding-ground deepened by thorough ploughing for crops during seasons of drought, is illustrated and enforced. We learn from pp. 26 and 27 that due importance is not generally attached to the selection and securing of the best varieties and qualities of seed for sowing the fields. Too often they sow any seed they have by them, the produce of their own fields, and often of inferior quality. Good kinds of grain, &c., are thus found to be confined to one village, though they might be grown successfully in many neighbouring places. Thus, the village of Jaláli in the Aligarh district is well known for its fine white wheat; Sánkni, in Bulandshahar, for its safflower; some districts north-west of Allahabad for indigo, and Hinganghát for cotton. The value of new

plants to India is discussed on pp. 31 and 32, the cases cited being tea, the potato, reana, and Egyptian cotton. Passing over a chapter in which some elementary facts about plant-food are given, we find many useful remarks (pp. 37 to 44) on the fertility of the soil and the means of restoring or increasing it. Here we are introduced to *reh* and *usar*. The former term is applied to the saline efflorescence, which, in some seasons especially, appear in many tracts of land in the North-West Provinces and elsewhere in India. *Reh* consists mainly of sodium and calcium sulphates, with some common salt and nitrates. The *usar* plain is infected with *reh*, but I cannot agree with Mr. Fuller in condemning the *usar* soils as sterile through deficiency of plant-food (p. 38). My analyses of such soils gave in most cases no evidence of deficiencies in the mineral elements of plant-nutrition, they merely showed an excess of soluble salts. What Mr. Fuller says about the best way of getting rid of *reh* is very judicious, so are his remarks about the sad waste of animal and vegetable residues (including indigo waste, and the bones of bullocks and buffaloes, in India)—residues which, instead of being burnt or neglected, should certainly be much more largely than at present ploughed into the land. His contrast between the work of the Indian plough and the English, the latter doing in one ploughing what the former needs twelve ploughings to accomplish, should be of some real service, especially as the new English-pattern ploughs made at Cawnpore are very light, and do not cost more than eight rupees apiece. By the use of this improved implement the "pan," which has been formed two or three inches under so large a tract of Indian soil by the rubbing of the old ploughshares and the trampling of the bullocks, would be broken up, and the rains would penetrate and moisten a much greater depth of soil. Mr. Fuller illustrates the advantage of increasing by such deep ploughing the depth of water-holding soil. He says: "In Madras, in the year 1878, when there was a great famine from the failure of the rains, some land was ploughed with the European plough, and some with the native plough, on the Government farm. Neither was irrigated, and both had to depend for their water on the little rain that fell. The European-ploughed land gave a rice-crop of six maunds per acre; the native-ploughed land did not yield a single grain." The two last lessons in this useful little book contain some quite satisfactory explanations as to the respective merits of canal and well water, and of thin and thick seeding in India.

A. H. C.

OUR BOOK SHELF

On the Crystallography of Calcite. By J. R. McD. Irby, B.Sc., of Lynchburg, U.S. (Bonn: Charles Georgi, 1878.)

ONE is pleased to find that, in an essay on the crystallography of calcite, by a gentleman who has received his training in America and Germany, the system of representation used by Prof. Miller has been adopted, and not the objectional modification employed by Professors Groth and Dana, jun. One regrets that the paper is unaccompanied by a stereographic projection, which would have much simplified the discussion of the distribution and position of the forms.

The original part of the essay consists of a criticism

and redetermination of some forms involving very high indices on crystals examined by the late M. Hesseberg. The measurements were made with one of the goniometers devised by Prof. Groth, which gives definite results when the faces are good. The collimator and telescope are fixed, however, at right angles to one another, so that the determination of striated faces, such as many of those examined were, is difficult and uncertain. Much more reliable measurements would be obtained were the angle between collimator and telescope small, and it would be very easy to arrange the collimator so that the angle of incidence and reflection might be varied at will. Prof. Miller used to arrange his goniometer so that the angle between the incident and reflected ray was less than 20° , and was thus able to get rid of a good deal of the difficulty arising from striation.

Mr. Irby has guarded himself from error by the comparison of several independent observations of the angles made by a new face with those adjoining it, with the angles obtained by calculation, and has avoided employing the angles made with faces on more distant parts of the crystal, though the latter would be often better adapted for purposes of calculation. He criticises Prof. vom Rath's method of observation by taking the reflection of a window-bar as signal. The error which would thus arise would not exceed 1' in the case of good faces, and I believe Prof. vom Rath only employs this method of observation with very good faces. Another source of error would be due to the proximity of the signal which would give a considerable error if the edge were not well-centred. Moreover, a goniometer with vertical plane of reflection is very difficult to get into or keep in good adjustment, and errors might arise in this way. None of these errors will, however, account for the impossibility of getting simpler indices for the form {35, 17, 32}, considering how definite were the angles obtained from the several faces of the scalenohedron. A careful criticism of this form at the time it was published, and of all the different ways in which errors might be piled up in the course of the analysis, failed to lead to any result but that of admitting the possibility of forms with these high indices. In the Cambridge collection is a crystal of quartz with an extremely well-developed face, which Prof. Miller has determined to be {50, 19, 19}. It is very slightly rounded on the edge of the prism face. Of course, when the faces are rounded or otherwise distorted, indices calculated from the observations are mere approximations. Seeing the great variations which occur in the angles of well-crystallised minerals, good work might be done in testing the constancy of the angle of the cleavage rhomb in the specimens from different localities. Breithaupt's determinations of this angle are unfortunately not sufficiently reliable.

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

[The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to ensure the appearance even of communications containing interesting and novel facts.]

The Molecular Velocity of Gases

YOUR correspondent, M. Hajniš, asserts in a foot-note appended to his letter published in NATURE, vol. xxi. p. 176, that "the formula for the molecular velocity (of gases) was first given by Krönig," and not by Joule. I am at a loss to understand how this statement can be justified.

Krönig's paper appeared in 1856, while Joule's calculation, which is that now generally received, is of date 1848. In his discourse on molecules (*Phil. Mag.*, December, 1873), Prof. Maxwell says: "The further development of the theory is generally

supposed to have begun with a paper by Krönig, which does not, however, so far as I can see, contain any improvement on what had gone before." R.

Weaver Birds and Fire-Flies

UNDER the heading "Natural History Notes from Burmah, in NATURE, vol. xx. p. 362 of the present series, Mr. R. Romanis asked if any of your readers have ever seen or heard of weaver birds sticking fire-flies to lumps of mud on the sides of their nest for the purpose of illumination.

The tradition that certain birds of the weaver family (*Ploceidae*) and their allies do this, is prevalent over a large portion of the globe inhabited by these birds. I have traced it personally from China, all parts of India, Burmah, Ceylon, the Malayan Peninsula, Indian Archipelago, Southern, Eastern, and Western Africa, and South America. I have examined "weaver birds" nests from all these countries, and have found lumps of mud sticking inside them, and "therefore it must be true, you know!!"

But for what use are these lumps of mud stuck there?

Some years ago I wrote an article in the *Cape Monthly Magazine* on this very subject, entitled "Strange Stories and their probable Origin," and I started by saying "Where there is smoke there must be fire," quoting the old proverb.

My belief is that these lumps of mud are used as scrapers on which to clean the birds' bills, as I have frequently found the wing cases, and other debris of *Coleoptera*, &c., fixed to them. Hence the superstition that they stick fireflies thereon. I should remind your readers that all the "weavers" are grain feeders and perhaps only occasionally partaking of insect-food, they are bothered by the bits sticking to their bills. I see my tamed birds are most careful in cleaning their beaks.

At the time I wrote my article above alluded to, I was not so conversant with the African "hang-nests" as I afterwards became, but I can affirm that in all the places I have named the superstition, and the mud, is to be found. E. L. LAYARD

British Consulate, Noumea, October 22, 1879

The Papau

PERMIT me to add to my friend the Rev. S. J. Whitmee's testimony of the papau being eaten by birds in the Samoan Islands, that it is here (New Caledonia) a favourite food of the "white eye" (*Zosterops*), and in the Loyalty Islands was used as the only bait to attract these birds, of which dozens were brought me—of the three known species of that genus which inhabit that group (see my letters to *Field* newspaper) all caught by the boys through its means. If my memory serves me rightly, I have seen the papau in Mauritius eaten by a species of *Zosterops*. E. L. LAYARD

British Consulate, Noumea, New Caledonia,

October 22, 1879

Scale of Colours

IN NATURE, vol. xxi. p. 172, it is stated that at a meeting of the Zoological Society, December 2, 1879, "A letter was read from Mr. E. L. Layard, F.L.S., advocating the desirability of a fixed scale of colour for use among naturalists in describing the plumage and pelages of birds and other animals." Perhaps Mr. Layard is not aware that such a scale, in form of thin 8vo, was published by Patrick Syme in Edinburgh, in 1821, the tints being illustrated by carefully coloured examples. The exact title of the work, a copy of which is in my own library, is as follows:—"Werner's Nomenclature of Colours, with Additions, arranged so as to render it highly useful to the Arts and Sciences, particularly Zoology, Botany, Mineralogy, and Morbid Anatomy. Annexed to which are Examples selected from well known Objects in the Animal, Vegetable, and Mineral Kingdoms." The date given above is that of the second edition, which was Printed for William Blackwood, Edinburgh, and T. Cadells, Strand, London." L. BLOMFIELD

Bath, December 22, 1879

(late JENYNS)

On the "Habitat" of *Lophiomy*s

ON reading the review of "Cassell's Natural History," vol. iii., given in NATURE, vol. xxi. p. 136, I find that both the author and the reviewer do not appear to have been aware that the "habitat" of that most interesting rodent, *Lophiomy's imhausi*, is